



Grade 7/8 Math Circles
February 22nd, 2012
Algebraic Approaches
Answer to the Exercises

1. Area = $30 - 6 = 24$

Perimeter = $5 + 12 + 6 + 3 + 4 + 2 = 32$

Approach: Area is straight forward, for perimeter, use the Pythagorean Theorem twice to find the missing length for the top piece.

2. $\frac{1}{3}$

Approach: Take out the common factor on both the numerator and denominator, then the common factors cross off nicely to get a final answer of $\frac{1}{3}$.

3. $n = 15$

Approach: Rewrite the left side as $(n^2)^{100}$, the right side as $(3^5)^{100}$, compare to get a final answer of $n = 15$.

4. $7^{222}, 6^{333}, 5^{444}, 3^{666}, 4^{555}$

Approach: Write each number, for example, 4^{555} , in the form of $(4^5)^{111}$, then compare.

5. 86

Approach: This problem is harder than the example problems since I don't know how many unit tests I've written so far. Let the number of unit tests I've written so far be x . Then see if you can determine x from the conditions given in the question.

6. 54400

Approach: This is a problem that requires a little spark of ingenuity. Adding two numbers is the same as adding the hundred's place digits, multiply by 100, adding the ten's place digit, multiply by 10, and adding the one's place digit, multiply by 1. (For example: $324 + 525 = 100(3 + 5) + 10(2 + 2) + 1(4 + 5)$) Can you use this fact to see how you can first use a counting argument to determine how many 3-digit completely even numbers there are, then add them?

7. 72 km/h

Approach: Let the distance from where Arthur started to David's house be n . n is the same regardless of how fast Arthur drives. Let the number of *whole hours* that Arthur drives be t . See if you can determine n and t from the conditions given in the question.

8. 13 hours and 20 minutes.

Approach: Same as the example problems, except this time you are given their combined total time and asked to determine the other individual's time.

9. * $x = 2$

10. * This is a classical problem in combinatorics. The answer is 6.